

ABSTRACT

[Abstract]

[Object] A bulk material which is suitably used as a material for actuator and sensor elements is formed from a Fe-Ga base magnetoresistive alloy and a Ti-Ni base shape memory alloy taking advantage of crystal miniaturization and anisotropy as well as reduction of precipitates (equilibrium state in state diagram) and non-equilibrium phases peculiar to liquid rapidly solidified materials, and the performance of the material is enhanced by a production method thereof which has cost advantage over a melt method.

[Construction] A rapidly solidified material having a particular rapidly solidified texture of a Fe-Ga magnetostrictive alloy or a TiNi-based shape-memory alloy and properties derived therefrom is formed into slices which are laminated to each other in a die, or is formed into a powder or chops which are filled in the die. Subsequently, spark plasma sintering is performed so that bonds between the slices, grains of the powder, or the chops are formed at a high density to form a bulk alloy, followed by annealing whenever necessary, so that the properties of the alloy are improved.